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UNITED STATES DEPARTMENT OF AGRICULTURE
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VARIETIES OF THE SATSUMA ORANGE GROUP
IN THE UNITED STATES

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SATSUMA VARIATIONS.

In developing any industry the first important factor is a uniform product. One reason for the lack of success of many of the fruit industries of this country has been the attempt to market too many varieties, as a result of which no uniform grade could be established.

At first glance it would seem that there would be no difficulty of this sort in marketing Satsuma oranges. However, it has been apparent to growers, nurserymen, and others interested in the development of the Satsuma orange industry in the Gulf States that there is great variation in the quality, shape, size, and time of maturity of fruits from individual trees. This has usually been attributed to some local conditions, such as differences in the soil or differences caused by cultural methods. While it was conceded that a certain part of this variation might be traceable to the presence of different varieties of Satsuma oranges in the orchard, very little definite evidence had been secured on this point in the United States. More recently, however, it has been found that there are a number of distinct varieties of the Satsuma type in Japan and that some of these have been introduced into the United States. The knowledge of this fact furnishes a new viewpoint for the future development of the Satsuma orange industry.

JAPANESE VARIETIES.

The discovery of the existence of distinct varieties of Satsuma oranges in Japan was made as a result of a thorough study of the varieties of that country by Dr. T. Tanaka, of the Office of Crop

Physiology and Breeding Investigations of the Bureau of Plant Industry, United States Department of Agriculture.¹

Six major varieties found in Japan have been described by Dr. Tanaka. These varieties are based on differences in the shape of the fruit, texture of the skin, dessert quality, and time of ripening. Correlated with these fruit characteristics are distinct variations in the shape of the leaves and in the habit of growth of the trees. In addition to the six major varieties, a number of minor variations within the varieties have also been described.

VARIETIES FOUND IN THIS COUNTRY.

During November, 1917, a survey of many of the bearing orchards in Mobile and Baldwin Counties, Ala., was made by Dr. Tanaka and the writer. By means of Dr. Tanaka's descriptive notes, drawings, and illustrations of the Japanese varieties, it was possible to classify the different trees found in these orchards. Four distinct varieties were found. In most of the older orchards the trees were uniform, sometimes of one variety, sometimes of another. In the younger orchards, 3 and 4 years old, the plantings were not uniform, and in some three distinct varieties were found.

DESCRIPTIONS OF VARIETIES.

The three important varieties found were the Owari (O-wah-ry), Ikeda (E-kay-dah), and Zairai (Zi-ri). The fruits of the Owari are flat, thin skinned, depressed at both the blossom and stem ends, and practically seedless, maturing in Alabama the latter part of October or first of November. The leaves are very broad, particularly at the base, and the tree has an upright habit of growth.

The fruits of the Ikeda variety are not as flat as those of the Owari, are not depressed at either the stem or blossom end, have a very coarse texture and a thick skin, and generally contain a few seeds. The season of the Ikeda is three or four weeks later than that of the Owari variety. The leaves are narrow, and the tree has a very spreading habit of growth.

The third variety, or Zairai, is the primitive form of the Satsuma orange in Japan. The fruits of this strain are larger than those of the Owari, are coarse textured and thick skinned, possess more seeds than either of the other two varieties, and when mature have a very insipid taste. The leaves are larger than those of the Ikeda variety but are not as broad as those of the Owari. The tree is a very vigorous, upright grower.

¹ Tanaka, T. Varieties of the Satsuma orange group in Japan. Crop Physiology and Breeding Investigation Cir. 5, 10 p., 2 fig. 1918.

Four trees of an earlier variety, the Wase, were also located. This variety in Japan matures its fruit the latter part of September. The tree is dwarflike in its habit of growth, and most of the Wase trees in Japan are alternate bearers.

In addition to these major varieties, a number of minor variations within the varieties were encountered. A complete description of these, together with drawings illustrating the leaves and fruits of the Owari, Ikeda, and Zairai varieties, is given by Dr. Tanaka in the circular entitled "Varieties of the Satsuma Orange Group in Japan."

NEED FOR SEGREGATING THE VARIETIES.

It is at once apparent that the presence of these different varieties explains in part the great difference of opinion which many people have concerning the merits of Satsuma oranges. A person eating an Ikeda the latter part of October, when the fruit has not yet reached its full maturity, would decide that the Satsuma orange was not a fruit of high dessert quality. On the other hand, if he first sampled an Owari, which is at its best at that season, he would assume that all Satsumas were of this same quality. It can be seen, therefore, that it is of the greatest importance that these varieties be segregated and that an attempt be made to pick, pack, and ship the fruit of each variety separately. Nurserymen can be of the greatest assistance in steadying the development of the Satsuma orange industry by so organizing their operations that these three varieties will be kept separate in their nurseries.

No statement can be made at this time as to the relative superiority of one variety over another. Further investigations will be conducted by the United States Department of Agriculture to determine (1) the hardiness of the different varieties, (2) their resistance to citrus canker, and (3) the behavior of the different varieties in ordinary and in cold storage. Until this evidence is secured it would appear that the Owari and Ikeda are the two important varieties for the nurseryman to carry. The Owari would assure oranges early in the season, and the Ikeda would give fruit some three to four weeks later.

INTRODUCTION OF THE DIFFERENT VARIETIES IN THIS COUNTRY.

After checking up the sources of the trees found in the two counties in Alabama covered by the survey mentioned, it can be stated definitely that several of the nursery firms which sold trees in that State five or more years ago introduced trees which were universally of the Owari variety, that approximately a similar number of nurseries introduced trees which were all of the Ikeda variety, and that at least

one nursery introduced trees which were distinctly Zairai, the primitive form of the Satsuma orange. In the later plantings, that is, in the orchards which have been set out in the last three or four years, there is no uniformity of varieties, and the natural assumption is that nurserymen, not recognizing the presence of these three distinct varieties, have cut bud wood indiscriminately in the different orchards and also in the nursery rows. This undoubtedly accounts for the great variation in the younger orchards. While the growers in some instances will be able to locate these distinct varieties in their orchards, the nurserymen are in a position to render the greatest assistance to the industry by keeping them separate in their nurseries.

LOCATION OF ORCHARDS PRODUCING UNIFORM VARIETIES.

Before securing any bud wood the nurserymen should make a close study of the fruit, leaf, and tree characteristics of a number of orchards and should not cut any bud wood from an orchard unless all the trees represent one fairly uniform variety. Wherever practicable, arrangements should be made with the growers whereby they will secure individual tree-performance records,¹ so that in addition to selling trees which are true to the variety name, the nurseryman can also furnish a statement of the actual quantity and quality of fruit produced by the trees from which the bud wood was taken. If, however, it is not practicable or if the nurseryman feels it is too great an expense to secure his bud wood from performance-record trees, he can at least cut bud wood only from trees which he knows are true to the variety name. Then, when his nursery trees are propagated, the Owari should be grown in one block and the Ikeda variety in another.

CUTTING BUD WOOD.

Only fruit wood from bearing trees should be used as the source of bud wood for nursery operations. No bud wood should be cut unless the fruits are actually present on the trees. The reason for this is that even in Owari or Ikeda trees fruit variations and limb variations are found, and the presence of the fruit is desirable as an additional guide in guaranteeing that the buds will be true to the varieties desired. If it is necessary to cut bud wood in the spring, the limbs from which the buds are to be taken should be marked the preceding fall. No bud wood should be cut from nursery trees.

SEGREGATING THE VARIETIES IN THE ORCHARD.

In many of the bearing orchards there is no uniformity in varieties. Sometimes the Owari, Ikeda, and Zairai will be found in the

¹ See U. S. Dept. Agr. Farmers' Bulletin 794, *Citrus-fruit improvement: How to secure and use tree-performance records*, 16 p., 4 fig. 1917.

same orchard. Because of the difference in the maturing season, it would not be practicable to assort the fruits in the packing house. The only feasible plan for separating the crop of these different varieties in mixed plantings is to pick the Owari oranges at a certain time, then later in the season those of the Zairai variety if any of them occur, and still later the Ikeda fruits.

Some weeks before the regular picking season the owner of the grove should make a careful inspection of his trees, studying the leaf, fruit, and general habit of growth of each tree. In this way he will be able to determine which of his trees are Owari and which are Ikeda or Zairai, if any of the latter are present. He should then mark each tree in such a way that he will have no trouble at picking time in locating all the Owari trees and later all those of the Ikeda variety. A very simple and practical plan would be to paint a letter on the tree trunk with white-lead paint. The letter *O* could be used to designate Owari trees, *I* Ikeda, and *Z* Zairai.

INTRODUCTION OF OTHER VARIETIES.

Although only three of the many varieties of Satsuma oranges known in Japan have as yet been introduced into commercial culture in the Gulf coast region of the United States, it is fortunate that among these three are found two which are said by Dr. Tanaka to have the highest reputation in Japan—namely, the Owari, the most widely cultivated early variety, and the Ikeda, the best late variety. It is, of course, possible that varieties will be found in Japan which are better than those now grown in this country, and active steps will be taken by the United States Department of Agriculture to secure from Japan all the principal varieties of the Satsuma orange, so that they can be tested under American conditions. Meantime it is of the utmost importance that the three varieties now commonly grown in this country be recognized and kept distinct by both the grower and the nurseryman. The Office of Horticultural and Pomological Investigations of the Bureau of Plant Industry, United States Department of Agriculture, will be glad to cooperate with the growers and nurserymen in furnishing information concerning these particular varieties.

Approved:

WM. A. TAYLOR,
Chief of Bureau.

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